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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS

MEMORANDUM FOREST SUPERVISOR, SHOSHONE NATIONAL FOREST

RE: CODY CANYON BARK BEETLE CONTROL PROJECT

By
James C. Evenden
Entomologist

Forest Insect Laboratory
Coeur d'Alene, Idaho
Sept. 30, 1936

Refer to file
Project 8-10

Forest Insect Laboratory
Coeur d'Alene, Idaho
Oct. 1, 1936

Dr. F. C. Craighead
Washington
D. C.

Dear Dr. Craighead:

There are enclosed two copies of a report which I have prepared following the completion of the 1936 survey of the Cody Canyon bark-beetle control project.

In addition to listing the areas which I consider warranted the institution of control, I have attempted to once more present this project in as true a light as possible. In my mind there is no question but that the reinfestation of the treated units comes from the so-called "back", or less accessible, areas. Obviously the reduction of these sources of reinfestation should materially reduce the infestation within the areas for which protection is especially desired. However, we know it is impossible to eliminate the beetles from such areas, and I feel quite confident that the infestation will continue as long as the budworm supplies decadent and dying host material. The expense of treating these less accessible areas would be very heavy, and I personally doubt if the saving which would follow through the reduced control within the river areas would justify such an expenditure.

I have experienced some difficulty in explaining this situation. It is a complicated problem, with events which I feel quite safe in predicting, but I have no data to support my contentions. I trust you will understand my position, and that my recommendations will meet with your approval. I should be glad to try to offer any additional explanation upon points which are not quite clear.

Respectfully yours,

James C. Evenden
Entomologist

P.S. This report has been very hastily prepared, and I should like to have taken more time. I do not like to write field season reports.

cc to:
Miller, Keen, Deal

MEMORANDUM FOREST SUPERVISOR, SHOSHONE NATIONAL FOREST

RE: CODY CANYON BARK BEETLE CONTROL PROJECT

The 1936 survey of the Douglas fir beetle control project of the Cody Canyon, Shoshone National Forest was instituted on August 3rd and completed on September 7th. Mr. A. L. Gibson of the Forest Insect Laboratory at Coeur d'Alene, Idaho, who was in charge of this operation, was assisted by Messrs. Herman and French.

Due to the large area covered by this survey, as well as the time available for the project, the data secured from each unit represented the coverage of only a very small percent of the total acreage. This necessarily small sample did not provide sufficient data to base an accurate estimate of the number of infested trees in the different units for which treatment will be necessary. However, as the securing of an appropriation for the institution of control was not involved in the execution of this project, such detailed data was considered unnecessary and the operation planned to secure sufficient information to determine the need for control. Though an estimate of the number of 1936-attacked trees has been given for the units surveyed, it is fully realized that there will be a marked difference between the estimates and the number of trees which will be spotted.

AREAS FOR WHICH CONTROL IS RECOMMENDED

Unit	Number of Infested Trees:			Remarks	
	Estimated No.:				
	No. of 1935: of 1936				
Acres:	attacks:	attacks			
Fishhawk (Lower)	786	68	135	This area shows an increase in the 1936 infestation as compared to the number of 1935 attacks which were treated. Infestation is also in an area of severe budworm defoliation.	
Fishhawk-Kitty Creek	200	--	133	This area lies between the Fishhawk and Kitty Creek drainages on the south side of the river	
Kitty Creek	600	34	162	Marked increase in the 1936 infestation as compared to the 1935 attacks. Infestation is concentrated on about 150 acres, which increases the actual number of trees per acre to 1.08.	
Dead Horse-Kitty Creek River Area	200	--	107	This area extends west from Kitty Creek for about 1 mile along south side of river. This infestation adjacent to valuable property.	
Dead Horse	100	17	79	The acreage of this area has been increased from 28 to 100 acres, which partially explains the marked increase in the infestation. In 1935 there were .607 trees per acre, while in 1936 there are .787	

Unit	Number of Infested Trees :				Remarks	
	: Acres :		: No. of 1935: Estimated No.:			
	: 1935		: attacks : of 1936 :			
Little Dead Horse	25	9	31		The increased acreage of this plot partially explains the increase in the infestation.	
	1936					
	60					
Eagle Creek (Lower)	560	40	101		There is no record of the 1935 infestation being treated, which if true would explain the increase. The infestation is concentrated on the west side of the drainage with 86 of the 101 trees being located in that area.	
Grinnell Creek-- North Fork Slope	250	18	167		This area lies along the north side of the river between Grinnell Creek and the North Fork. The marked increase in the 1936 infestation over 1935 indicates the necessity for control. Control measures should extend up Grinnell Creek as far as the area can be conveniently worked.	
Mormon-Grinnell Creek Slope	1,000	36	171		The 1935 infestation was not treated. Infestation is concentrated in a few patches of timber which justifies treatment.	

Unit	Acres	Number of Infested Trees			Remarks	
		No. of 1935: Estimated No.				
		attacks	of 1936	attacks		
Norman Creek	360	8	257		Marked increase in the 1936 infestation. Light 1935 infestation was not treated.	
Grever Creek	46	x 162	85		Small area. T. 52, R. 108, E 1/2 1/4 Sec. 8.	
Rieneckers	200	x 185	442		Data indicates a marked increase in the 1936 infestation.	
Slope between West Overlook and Rieneckers	80	--	22		Small area that should be treated.	
Overlook Gulch)						
West Overlook)	288	x 325	247		These are small areas adjacent to the road.	
West Overlook)						
Draw East of Libby Creek (Spring Draw)	300	x 535	1,900		The marked increase can only be explained by reinestation from other areas.	
Libby Creek	450	x 351	676		The acreage of this area has been more than doubled over that given for 1935. It is possible that it will be found to be impractical to treat all of this unit. Work should extend at least 1/2 mile above area for which protection is desired.	

x Trees treated in fall of 1935 or spring of 1936.

Unit	: Number of Infested Trees :				Remarks	
	: Estimated No.:					
	: No. of 1935:	of 1936	:	:		
Acres	attacks	attacks	x			
Golf-Libby Creek area	225	46	x	447	Data indicate a marked increase in the 1936 infestation. Area lies on north side of river between Libby and Golf Creek.	
Golf Creek	580	525	x	777	Data indicate a slight increase in the infestation, regardless of last season's control.	
Elephant Head and Little Elephant Head	256	163	x	453	The increase in the infestation is very largely due to an increased acreage covered by this year's survey.	
Chimney Rock Creek	127	225	x	91	Though the data secured indicate a slight reduction in the infestation, it is believed that this area should be included in all plans of control.	
West Lost Draw	102	956	x	226	Though the 1936 infestation is much lighter than the previous season, it still averages 2.21 trees per acre.	
Lost Draw	100	102	x	171	Increased infestation in this area warrants control.	

x Trees treated in fall of 1935 or spring of 1936.

Unit	Number of Infested Trees			Remarks	
	Estimated No.				
	No. of 1935	of 1936			
Acres	attacks	attacks			
Malisade Gulch	140	165	206	Increased infestation warrants control.	
Newton Creek	95	80	?	Data for this area is missing-- would seem that this area should be spotted to determine status of infestation.	
Cliff Creek	55	171	35	The area included in this year's survey was reduced from that covered in 1935. However, it is but a small area and should be covered.	
Castle Gulch	40		31	This area is west of Cliff Creek, and should be included in any plan of control.	
Cedar Gulch (lower)	95	--	266	This area includes the upper portion of the drainage which can not be worked from the road. Control should extend only as far up the drainage as can be economically reached from the road. This will not include more than 50-75 of the 266 trees listed for this drainage.	
Sawmill Gulch	500	284	395	Increased infestation warrants control.	

x Trees treated in fall of 1935 or spring of 1936.

AREAS WHICH COULD BE INCLUDED IN THE
AREAS RECOMMENDED FOR CONTROL IF TIME
AND LABOR ARE AVAILABLE

Unit	Number of Infected Trees			Remarks	
	Estimated No.				
	No. of 1935	of 1936	Acres		
Blackwater-West Fork	1,000	106		Cars can be driven to 1 1/2 miles of this area, which lies at the forks of the creek. However, as the area is some distance from the river, it's inclusion in the project area is questionable.	
Sheep Creek	256	18	40	Though the infestation on these two areas is reported as being very light, the lower portion of the drainage could be spotted to determine if there is sufficient infestation to justify treatment.	
Mesa Creek	171	40	0		
Gunbarrel Creek	424	489	69	Though the infestation in this area is recorded as being very light with most of the infested trees lying in the upper portion, it is believed that the lower part of the drainage should be spotted to determine if there are sufficient infested trees to justify treatment.	

AREAS WITHIN PROJECT UNIT FOR WHICH
NO CONTROL IS RECOMMENDED

Unit	Acres : 1935 : 1936			Remarks
Aspen Ridge	119	--	--	1934 Infestation treated
Aspen Creek	400	--	14	1934 Infestation treated
Moss Creek (Lower)	138	43	--	1934 Infestation treated
Libby Flat	49	14	--	1934 Infestation treated
Blooms Gulch	144	--	--	1933 Infestation treated
June Creek	852	--	--	1932 Infestation treated
Beetle Gulch	395	--	--	1934 Infestation treated
Chimney Rock Flat	26	--	--	1932 Infestation treated
Lower Gulch	30	--	--	1934 Infestation treated

AREAS NOT ACCESSIBLE FROM ROAD WHICH ARE
NOT RECOMMENDED FOR CONTROL

Unit	Acres	Estimated No.		Remarks
		of 1936	attacks	
Cedar Gulch (Upper)	40	200		Area inaccessible from road, requiring the establishment of a camp.
Newton Creek (Upper)	1,000	1,873		
Koss Cr. (Upper)	1,500	1,138		
Sunbarrel Cr. (Upper)	560	79		Area inaccessible and infestation light.
Blackwater (Upper)	1,075	231		Areas inaccessible, though West Fork Unit could be reached by trail. Infestation not very heavy and somewhat remote from areas for which protection is desired.
Fishhawk Cr. (Upper)	3,243	748		Areas inaccessible and remote from areas for which protection is desired.
Eagle Cr. (Upper)	1,000	100		Infestation on decline and inaccessible from road.
North Fork Units	2,200	1,147		These areas would require the institution of camps. Infestation reported as increasing in some portions.
Elk Fork	---	---		Heavy budworm infestation, but very little bark-beetle damage.

Unit	Acres	Estimated No. of 1936 attacks	Estimated No. of 1936 attacks	Remarks
			Estimated No. of 1936 attacks	
Pagoda, Clocktower, Lost, Nameit, and Canyon Creeks				Infestation on these units is too light to warrant control under any plan.
Grizzly Cr. & Morse Cr.	106			Infestation reported at a standstill. Would require institution of camps. Remote from areas for which protection is desired.
Clearwater Creek	7,700	260		Infestation reported as decreasing, with practically no budworm damage.
Clearwater	3,640	261		Decrease in the infestation.

ANALYSIS OF DOUGLAS FIR BARK BEETLE
SITUATION AS REVEALED BY THE 1936
SURVEY

As the sixth year of the Cody Canyon bark-beetle control project of the Shoshone National Forest is approached, it would seem that the existing situation should be reviewed with an appraisal of the results that have been accomplished, as well as what may be expected in the future. It also seems that such an analysis is necessary in explanation of our failure to recommend treatment for the so-called back, or less accessible, areas, which are undoubtedly the source of annual re-infestation to the treated areas.

This project was instituted in 1931. It was directed against an outbreak of the Douglas fir beetle (Dendroctonus pseudotsugae Hopk.) in stands of Douglas fir which had been, and were still being, defoliated by the spruce budworm (Cecropia fumiferana Clem.). The primary objective of this operation was the protection of the scenic timber stands along the floor of the canyon, as well as around the many resorts, summer homes, camp grounds, etc. Since the institution of this project annual reports have been submitted depicting the results secured by control with recommendations for future work.

During the years subsequent to the institution of this project there has been considerable change in the original areas as treated in 1931. Some drainages have been dropped as no longer warranting control, while others have been added. The variation in the total acreage

covered by control for each year of this project, as well as the number of trees treated, is as follows:

Year	1931	1932	1933	1934	1935	1936
Acreage	4,181	5,325	4,193	4,844	3,440	7,805
Trees Treated	12,038	5,343	2,512	2,096	3,825*	5,017**

* Project was not completed--235 trees were spotted and not treated.

** Data are an estimate only.

From the preceding tabulation it is rather apparent that very little progress has been made in securing a permanent reduction in the bark-beetle population. This lack of success has been, and is still, due unquestionably to the severe bark-beetle infestation which exists within the untreated areas adjacent to the control units from which the annual reinestation occurs, and the fact that the budworm defoliation has provided a continuous supply of attractive, weakened host material in both the treated and untreated units. It is obvious that the ultimate success of this project is dependent upon these two factors, and it is unfortunate that we have but very little, if any, control over them. It is believed that, regardless of the scope or intensification of control, a potential bark-beetle epidemic will exist as long as dead and dying trees are left by budworm defoliation. It is also believed that the number of infested trees is governed very largely by the supply of such material which is available in each unit.

The past years of control have failed to effect a permanent re-

duction in the beetle population; however, it must be remembered that had no control been instituted, the increase from the 12,038 trees treated in 1931, plus the increase from the annual reinfestation, would have resulted in a tremendous insect population. Such an increased beetle population could not have been absorbed by the decadent host material available, so undoubtedly large numbers of the more thrifty trees around the resorts, camp grounds, etc., would have been destroyed. Furthermore, the project has been entirely successful in accomplishing its objective. During this operation none of the trees around the resorts, etc., which have been sprayed each year in order to reduce the budworm injury, have been attacked by bark beetles.

Regardless of past accomplishments, we are confronted with the following situation. With but a few exceptions the areas adjacent to the river, which were recommended for control following the 1935 survey, were treated either in the fall of 1935 or the spring of 1936. Though some of the more heavily infested back areas were recommended for inclusion in last year's operation, it was found to be impracticable to treat them with CCC labor, due to their degree of inaccessibility. The 1936 survey, which has but recently been completed, reveals a rather marked increase in the degree of infestation in many areas, with substantial reduction in others. This variation in the results has persisted throughout the previous years of control, and would seem to indicate that the reinfestation which occurs within the treated units is not the result of inefficient control, but undoubtedly due to the spread of beetles from the untreated, less accessible areas.

adjacent. Though the relationship which the infestation within the so-called back areas would have upon the treated units was recognized at the institution of this project, its seriousness was underestimated, as the persistent continuation of the budworm epidemic was not anticipated.

There are now twenty-eight units that are adjacent to the river, or the area for which protection is desired, and for which control has been recommended. These twenty-eight units comprise a total of 7,605 acres, with an estimated Douglas fir beetle infestation of 8,017 trees. With this situation it is obvious that unless control is instituted within these units the infestation will increase to a degree which will endanger the scenic timber stands at stake. Though these infested trees can, and will undoubtedly, be treated, the discouraging feature of this project is that in 1937 the units covered by control will again be reinfested. The severity of the anticipated reinfestation can not be foreseen, as it depends upon factors previously mentioned and upon which no control can be exercised. It is true that if the more heavy centers of infestation, which have acted and will continue to act as a source of reinfestation, could be reduced through the institution of control, the severity of the reinfestation which will occur in 1937 could be lessened. However, with such a plan, which of course is not impossible, there would be many attending difficulties that can not be visualized unless one is familiar with the areas in question. The cost of one season's control

would be excessive, and subsequent maintenance work would be necessary to prevent the infestation from rebuilding to its former severity, as the beetles could not be eliminated by one season's work. However, there is a possibility that if the infestation in these back areas could be materially reduced, the beneficial effects of such an action might extend over a sufficient period to prevent any severe reinfestation within the river areas until the hoped-for cessation of the budworm epidemic occurred. Such a hoped-for result would be the only justification for the institution of control within these so-called sources of reinfestation, and it is not believed that the chance of success which could be offered would warrant the expense. This position is based upon the premise that as long as there are decadent and dying trees within the units for which protection is desired, there will be an infestation of the Douglas fir beetle which will build to epidemic proportions unless control measures are continued. If this premise is true, and I believe it is, there would be no object in adding to the present project the burden of control in the less accessible areas, as it would still be necessary to continue the operation within the units that are now being treated. Though it is true that the number of infested trees would perhaps be reduced somewhat, it is doubtful if the saving would compensate the expense of control in the less accessible areas.

At the present time there is only a very small percent of the infested trees that are actually being killed by bark beetles, as their

death was assured by the severe budworm defoliation. Though many trees are devoid of foliage and appear to have been dead for a year or more, there is sufficient green cambium at their base to harbor a beetle attack. A rather large percent of the 1936 attacks are confined to the lower three or four feet of the base of decadent and dying trees, with many one-sided attacks. Furthermore, though we have no actual data, it would seem that a much larger percent of the broods are being destroyed by parasites and predators than at the institution of this project. So though there is still a large number of trees containing 1936 attacks of the Douglas fir beetle, they would not have been considered as normal "bug trees" during the earlier years of this project. In brief, we are confronted with an infestation which is being carried from year to year by the attractive supply of host material which has been and is still being created by budworm defoliation. When this supply of host material is exhausted, which will be when the budworm epidemic is no longer present within the areas at stake, it is believed that the bark-beetle epidemic will subside. In granting this premise to be true, the task of preserving the scenic areas at stake lies in preventing the infestation immediately adjacent to the resorts, etc., from developing to such a magnitude that not only will the decadent trees be absorbed but the infestation extended into the more thrifty, scenic timber stands for which protection is desired. On this basis the recommendations for control have been confined to those areas which are accessible

to the river road and which are an immediate threat to the areas for which protection is desired.

The period over which it will be necessary to carry this project can not be foreseen. As stated, this period is believed to be contingent upon the budworm outbreak. Prophecies have been made as to the cessation of this epidemic, which have only revealed the uncertainty of such efforts. A potential break may have occurred with the destruction of a large percent of the Douglas fir buds, which is believed to have been the result of unseasonal temperatures in May 1936. This condition resulted in a marked reduction in the available food supply, which may have caused considerable budworm mortality through starvation. Though beneficial in one direction, this condition may have been detrimental in another, for the budworm injury to those buds which did mature and produce new foliage was so severe as to result in nearly a 100% defoliation of all 1936 growth. The effect of this severe injury is unknown, though one may be sure that it will undoubtedly result in an increased quantity of attractive host material for bark-beetle attack in 1936. At this time no prediction relative to the possible cessation of the budworm epidemic is made.

In final summation of the Cody Canyon situation, it is recognized that as a result of the spraying operation which has for the past few years been confined to areas around resorts, etc., the budworm injury on these trees has been reduced to a degree where no

irrecoverable damage has resulted. Furthermore, control measures directed against the Douglas fir beetle have successfully held the epidemic to a point where there has been no damage whatever within the areas along the highway and immediately adjacent to the many resorts, summer homes, etc. It is sincerely believed that if the present project is continued until the budworm epidemic subsides, the same success can be expected in the future as has been secured in the past.

The economic justification for this project must rest with the scenic value which the timber affords to the area, watershed protection and erosion control, as well as the value of individual trees to summer homes, resorts, etc. These values are somewhat intangible, but it is believed that they are sufficient to justify the action which has been taken. The justification for the continuation of this project until such time as the budworm epidemic subsides is an important economic problem warranting serious consideration.

CONCLUSION

In recommending that control measures be confined to the more accessible areas, it should be understood that we are not opposed to the treatment of the heavy centers of infestation within the less accessible units, for, as stated, their reduction would have entomological justification. The question would seem to be the balancing of the expense of such an operation against the hoped-for permanent reduction of the infestation within the river areas. Though I do

not believe that the chance of success would justify the heavy expense involved, it is fully recognized that such a position may be in error. Furthermore, this situation is further complicated by the continued budworm epidemic which leaves an annual supply of decaying and dying host material. It is believed that when the budworm outbreak subsides the institution of control within all areas might be of far more value than at this time.

Respectfully submitted,

James C. Ivenden
Entomologist